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ABSTRACT

A study examined the use of cloze procedure as a measure of learning from content instruction. Subjects were 35 physician assistant (PA) students in a cancer prevention course and 31 education students (ED) enrolled in reading instruction courses. Cloze passages were constructed from published selections on the reading process and occupationally related cancer. Every fifth word was deleted, except for the first and last sentences. Scoring was for exact replacement. Analysis of covariance was used to compare posttest scores of the two subject groups with corresponding pretest scores as covariates. PA students surpassed reading students on total scores on the cancer passage, showing the greatest gains on content related words. Superiority of the PA students on this passage was ascribed to the effects of content instruction. However, the ED students did not achieve superior scores on the reading passage, possibly because they failed to incorporate this subject matter from their reading education courses. (Suggestions for improving the selection and use of content related words are included.) (HTH)

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EFFECT OF CONTENT INSTRUCTION ON CLOZE PASSAGE PERFORMANCE

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ABSTRACT

The study examined the use of cloze procedure as a measure of learning from instruction. Cloze passages were constructed from published selections concerning the reading process and occupationally-related cancer. Every fifth word was deleted. Scoring was for exact replacement. Content and non-content words, identified by judges, were scored separately. Subjects were enrolled in either a course in cancer prevention or a course in teaching reading.

Analysis of covariance was used to compare posttest scores of the two groups of subjects with corresponding pretest scores as covariates. Cancer prevention students surpassed reading students on total scores of the cancer passage as was predicted. They showed greatest gains on content related words of the cancer passage. Superiority of the cancer prevention students on the cancer passage was ascribed to the effects of content instruction. However, reading students were not superior on total scores of the reading passage. Conditions for improving the selection and use of content-related words are suggested.

This study concerns the use of cloze procedure as a measure of learning from instruction. Cunningham and Tierney (1979) evaluated the use of cloze procedure as a measure of learning from reading. In that study cloze passages were used as pre and posttests. The experimental groups read the intact passages immediately before posttesting. They found that most cloze measures that they employed were sensitive to the learning that occurred from reading the intact text. Several studies, however, failed to show that the gain in cloze performance substantially exceeded practice effect (Coleman & Miller, 1968 Carver, 1973, 1974). Carver (1973) even questioned the validity of cloze "as a measure of what is understood during reading". Rankin (1974) suggests that the failure of Coleman and Miller to find significant gains may have resulted from their using "every n th" deletion rather than lexical deletions. The former probably deletes more structure words.

These prior research studies investigated the use of cloze to measure learning from reading intact text. The purpose of those studies was to evaluate cloze and other techniques as indicators of comprehension and storage effects of normal reading. The present study was intended to learn whether cloze was sensitive to increased knowledge acquired from sources other than the intact passage. To measure long-term memory regardless of source, rather than passage-specific recall, appears to approximate more closely the naturalistic learning, storage, and retrieval activities of school and of life in general. The study also scores separately

content words and non-content words to overcome the neglect of lexical deletions criticized by Rankin.

MATERIALS

Two cloze passages were constructed from passages in published sources. One passage is from a text on reading instruction, the other from a compilation of articles on occupational disease. The first passage concerns the reading process; the second concerns occupationally-related cancer. The cloze passages were constructed with every fifth word deleted, except for the first and last sentences. All blanks were equal in length. Scoring was for exact replacement.

Randomized word lists were prepared, one from each set of the words deleted from the passages. Each word list was presented to three judges representing the discipline reflected in the passage content. Three judges who teach college reading education courses and three judges who are knowledgeable about cancer (two physicians and a pharmacologist) identified those words that are particular to the subject matter of the respective passage.

SUBJECTS

Subjects were thirty-five physician assistant (PA) students at Northeastern University enrolled in an elective course on aspects of cancer prevention. Thirty-one were education students (ED) enrolled in introductory courses on the teaching of reading at Wichita State University or Northeastern University. About half of the education students were graduate students and half undergraduates.

PROCEDURE

The two cloze passages were administered during the initial and final sessions of one-quarter courses.

Passage order was alternated; half the group first responded to the READING passage, half first responded to the CANCER passage. The specific sources of these passages were not included in the assigned readings of the respective courses. There was no discussion of the passages following administration.

ANALYSIS OF DATA

The list of deleted words was subdivided for scoring based on the judges' identification of words particular to the subject matter. A word was considered subject matter or content related if selected by two of three judges. Cloze passages yielded three scores; content words, non-content words, and total. Inter-judge correlations for identifying content-related words were computed.

The experimental hypothesis was that gains exceeding those attributable to practice effects would be made only on the passage reflecting the content instruction that was received. Two analyses were performed. First, correlated t tests were used to establish whether posttest scores were greater than corresponding pretest scores. Second, analysis of covariance was used to determine whether posttest scores of P A Students differed from those of E D Students, with corresponding pretest scores as covariates. Figures 1 and 2 illustrate supportive hypothetical results.

RESULTS

Inter-judge correlations for identifying content-related words are reported in Table I. The phi-coefficient is reported; chi-square values are computed to test for the significance of the correlation coefficients. All three correlations were significant for the CANCER judges; two of three were significant for the READING judges. All correlations may be described as low or moderate.

Results of the t tests for correlated observations are presented in Table 2. P A Students made significant gains on all subscores on both passages. Improved performance on the CANCER passage was hypothesized. E D students made significant gains on total scores of both passages and on non-content word scores of the READING passage. Improved performance only on the READING passage was expected. Examination of the magnitude of changes (in percent) and of the strength of significance levels is supportive of the predicted direction of change.

Table 3 presents the analysis of covariance results. It shows that P A students surpassed E D Students on total scores of the CANCER passage, as predicted. However, E D students were not superior to P A students on total scores of the READING passage. The experimental hypothesis, therefore, is supported only partially. Similar results were obtained for both content-related words and non-content words. Separately scoring content-related words had no appreciable result. However, the one non-significant difference between the groups on the READING passage that favored E D students occurred on the content-related words.

DISCUSSION

The two groups (P A and E D) were quite dissimilar in their initial background and knowledge regarding the CANCER passage. Applying a 44% standard for instructional level, the CANCER passage was "easy" for P A students (mean pretest total was 50%) and "difficult" for E D students (mean pretest total was 33%). In future research, such initial differences between groups should be avoided. Nevertheless, adjusted posttest means reflect differences after pretest results are statistically equalized. Therefore, the superiority of the P A students on the CANCER passage posttest can partly be attributed to the effects of content instruction.

Failure of the E D group to show superior posttest performance in the READING passage, or to show significant gain on content-related words, may result from possible failure to incorporate the subject matter specific to the passage in the reading education courses taken by these students. The investigator selected the CANCER passage based on its close correspondence to the course content of aspects of cancer prevention. P A students showed their greatest gains on content-related words of the CANCER passage.

Rankin's suggestion that emphasis be given to lexical deletions or, in this study, content-related words may be justified. In retrospect, the selection of content-related words by judges may be improved if they are given the intact passages with words-to-be-deleted underlined. A choice of greater validity may then be effected.

In typical use, cloze scores may be considered measures of redundancy. This in part is why cloze is relatively insensitive to the gain in information acquired through reading. Completion of blanks is possible because the information is contained in undeleted segments of text, and because additional cues are available to point to the identity of information in undeleted and deleted segments. Perhaps passages having some content-related words only in deleted segments would be more sensitive to the effects of instruction.

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FIGURE 1. HYPOTHETICAL RESULTS OF PRETEST - POSTTEST COMPARISONS.

P A Students	E D Students
Reading Passage	Reading Passage
Pre = Po	Pre < Po
Cancer Passage	Cancer Passage
Pre < Po	Pre = Po

FIGURE 2. HYPOTHETICAL RESULTS OF ANALYSIS OF COVARIANCE.

Reading Passage

PA Po < ED Po

Cancer Passage

PA Po > ED Po

TABLE 1. INTER-JUDGE* CORRELATIONS FOR IDENTIFYING CONTENT-RELATED WORDS.

JUDGES	r ϕ	CHI-SQUARE	SIGNIFICANCE
A & B	.730	24,545	<.01
A & C	.401	7.415	<.01
B & C	.522	12.541	<.01
D & E	.442	7.816	<.01
D & F	.352	4.964	<.05
E & F	.232	2.147	<.20

*CANCER PASSAGE WORDS JUDGED BY A, B, AND C.

READING PASSAGE WORDS JUDGED BY D. E, AND F.

TABLE 2. COMPARISON OF PRE-AND-POST-ADMINISTRATIONS OF CLOZE PASSAGES (READING AND CANCER)

	PRETEST			POSTTEST			t	Significance
P-A (n=35)	Mean	S D	% Correct	Mean	S D	% Correct		
READING Content	3.0	.89	(27)	3.5	.74	(32)	2.514	<.05
Non-Content	13.6	2.55	(47)	14.6	2.36	(50)	2.425	<.05
Total	16.6	2.90	(42)	18.0	2.53	(45)	2.959	<.01
CANCER								
Content	5.8	1.52	(58)	6.7	1.48	(67)	3.403	<.01
Non-Content	17.1	3.00	(48)	18.2	2.26	(51)	2.337	<.05
Total	22.9	3.59	(50)	24.9	3.16	(54)	3.302	<.01
ED (n=31)								
READING Content	3.4	1.26	(31)	3.8	1.05	(35)	1.985	NS
Non-Content	12.5	2.41	(43)	13.5	2.14	(47)	2.832	<.01
Total	16.0	2.95	(40)	17.4	2.79	(44)	3.558	<.01
CANCER								
Content	3.7	1.95	(37)	4.1	2.02	(41)	1.009	NS
Non-Content	11.4	2.98	(32)	12.2	3.19	(34)	1.734	NS
Total	15.2	4.26	(33)	16.3	4.49	(35)	2.234	<.05

TABLE 3. ANALYSIS OF COVARIANCE FOR POSTTEST RESULTS BY GROUP WITH CORRESPONDING PRETESTS AS COVARIATES.

	Dependent Variable (Posttest)	Covariate (Pretest)		Group PA (n=35)	Group ED (n=31)	F	Significance of F
	READING Passage						
1.	Content	Content	Adjusted M	3.53	3.73	1.000	.321
			Unadjusted M	3.46	3.81		
2.	Non-Content	Non-Content	Adjusted M	14.31	13.84	1.010	.319
			Unadjusted M	14.57	13.55		
3.	Total	Total	Adjusted M	17.86	17.54	0.354	.554
			Unadjusted M	18.03	17.35		
	CANCER Passage						
4.	Content	Content	Adjusted M	6.30	4.59	14.295	<.001
			Unadjusted M	6.74	4.10		
5.	Non-Content	Non-Content	Adjusted M	16.75	13.79	15.004	<.001
			Unadjusted M	18.17	12.19		
	Total	Total	Adjusted M	22.65	18.83	13.552	<.001
			Unadjusted M	24.91	16.29		